UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 27510

CSAH NO. 15

OVER THE

ARCOLA CHANNEL

DISTRICT 5 - HENNEPIN COUNTY

PREPARED FOR THE

MINNESOTA DEPARTMENT OF TRANSPORTATION

BY

COLLINS ENGINEERS, INC.

JOB NO. 5221 (CEI 112)

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge 27510, Piers 1 through 7, were generally in good condition below water with no defects of structural significance observed. Minor impact and/or ice related damage was evident at several of the piles at various locations above and below the waterline. The steel pipe pile casings typically exhibited coating failure with light to moderate corrosion and/or rust bleed-through near the waterline. The channel bottom around the substructure units appeared stable with no evidence of significant scour and no appreciable changes since the last inspection.

INSPECTION FINDINGS:

(A) The steel pipe pile casings typically exhibited coating failure with light to moderate surface corrosion and with minor pitting up to 1/8 inch deep perimeter from 1.5 feet above to 1 foot below the waterline. In some instances, deterioration (lighter in extent) extended further above water.

(B) Several of the steel pipe piles exhibited minor dents probably due to impact and/or ice related damage above and below the waterline.

(C) The concrete pile cap of Pier 7 exhibited areas of section loss approximately 1.5 feet long and 6 inches high on the west end with exposed reinforcing steel on the top and bottom edges.

(D) Minor cracking was observed at the northwest end and heavy cracking at the southeast end of the Pier 6 and Pier 2 pier caps. In addition, the pier cap ends in general exhibited random cracking.

(F) The pier cap at Pier 5 has exposed reinforcing steel at the southeast end on the south side of Pier 5. Section loss similar to that described at Pier 7.

RECOMMENDATIONS:

(A) An above water inspection should address the pile cap end conditions at most piers.

(B) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Daniel G. Stromberg

Date 6/30/2008 Registration No. 21491

Respectfully submitted,

COLLINS ENGINEERS, INC.

Daniel G. Stromberg
Registered Professional
Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: 27510

Feature Crossed: Arcola Channel

Feature Carried: CSAH No. 15

Location: District 5 - Hennepin County

Bridge Description: The superstructure consists of eight spans of multiple steel girders supporting a reinforced concrete deck. The superstructure is supported by seven steel cast-in-place concrete pipe pile bent piers and two reinforced concrete abutments. The abutments are founded on treated timber piling. The piers are numbered 1 through 7 starting from the south end of the bridge.

2. INSPECTION DATA

Professional Engineer/ Team Leader: Daniel G. Stromberg, P.E., S.E.

Dive Team: Clayton G. Brookins, Valerie Roustan

Date: October 18, 2007

Weather Conditions: Partly Cloudy, 60 ºF

Underwater Visibility: 3.0 feet

Waterway Velocity: Negligible/None

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 1 through 7

General Shape: Piers 1, 3, 5, and 7 consist of a single row of nine steel pipe, cast-in-place concrete piles. Piers 2, 4, and 6 consist of two rows of five battered steel pipe, cast-in-place concrete piles. The piles of each pier support a rectangular reinforced concrete pier cap.

Maximum Water Depth at Substructure Inspected: Approximately 14.0 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the pier cap at the west end of Pier 7.

Water Surface: The waterline was approximately 11.7 feet below reference. Waterline Elevation = 930.2.

5. NBIS CODING INFORMATION (Minnesota specific codes are used for 92B and 113)

Item 60: Substructure: Code 7

Item 61: Channel and Channel Protection: Code 8

Item 92B: Underwater Inspection: Code B/10/07

Item 113: Scour Critical Bridges: Code I/91

Bridge is scour critical because abutment or pier foundation is rated as unstable due to observed scour at bridge site.

_____ Yes X No

Photograph 1. View of Pier 1, Looking South.

Photograph 2. View of Pier 2, Looking South.

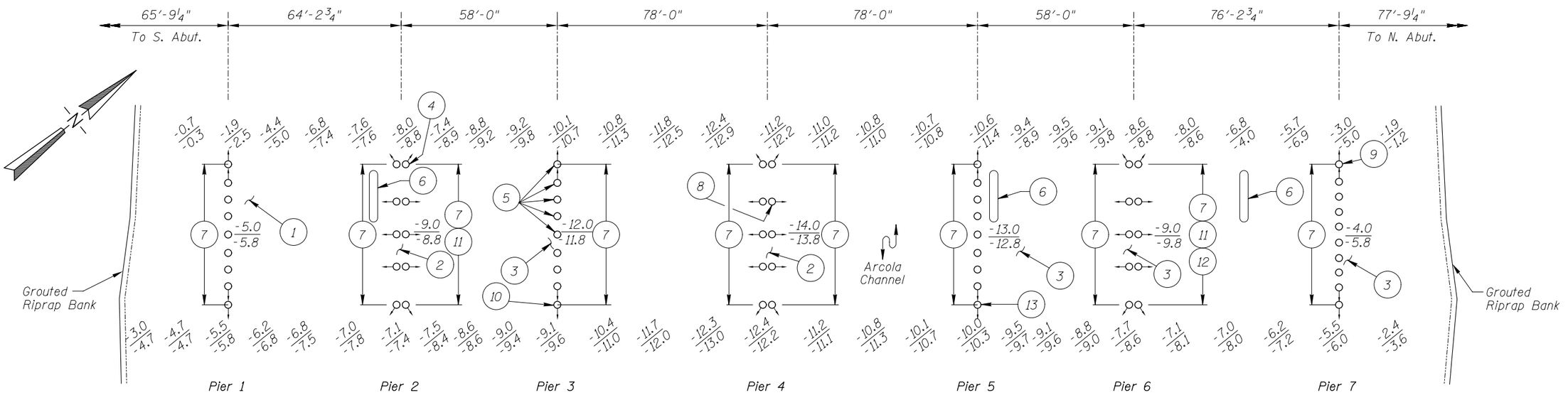
Photograph 3. View of Pier 3, Looking South.

Photograph 4. View of Pier 4, Looking South.

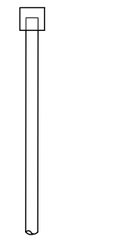
Photograph 5. View of Pier 5, Looking South.

Photograph 6. View of Pier 6, Looking South.

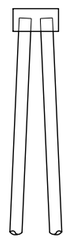
Photograph 7. View of Pier 7, Looking South.



SOUNDING PLAN



TYPICAL END VIEW OF PIERS 1, 3, 5 & 7



TYPICAL END VIEW OF PIERS 2, 4 & 6

INSPECTION NOTES:

1. The channel bottom around Pier 1 consisted of firm sand with 3 inches of maximum probe rod penetration.
2. The channel bottom around Piers 2 and 4 consisted of gravel, concrete rubble, and abandoned timber piles.
3. The channel bottom around Piers 3, 5, 6 and 7 and between the piers consisted of silty sand and scattered rocks up to 2 feet in diameter.
4. The steel pipe pile casing exhibited a dent that was 4 inches in diameter with 2 inches of penetration and was located 5 feet below the waterline on the northwest pile of Pier 2.
5. Five steel pipe pile casings at the west end of Pier 3 exhibited dents that were 12 inches long with 1 inch of penetration and were located 5 to 7 feet below the waterline.
6. Abandoned concrete piers were encountered near Piers 2, 5, and 7 and extended approximately 1 foot above the waterline.
7. The steel pipe pile casings typically exhibited light to moderate surface corrosion with minor pitting with rust scale delaminations up to 1/8 inch thick from 1 to 1.5 foot above to 1 foot below the waterline.
8. The steel pipe pile casing exhibited a dent 3 feet above the waterline that was 8 inches in diameter with 1/2 inch of penetration. A second 12 inch diameter dent was observed at 2 feet below the waterline, with 5 inches of penetration.
9. The concrete pile cap exhibited areas of section loss approximately 1.5 feet long and 6 inches high on the west end with exposed reinforcing steel on the top and bottom edges. 2 to 3 inch penetration and wide spread cracking with rust staining.
10. The concrete repair to the pile cap at the east end of Pier 3 exhibited a crack extending from the top to the bottom of the pile cap on the south face.
11. Minor cracking at Northwest end and heavy cracking at Southeast end of pier cap at Piers 6 and 2.
12. The piles exhibited lighter corrosion and/or coating failure from channel bottom to 6 feet above waterline.
13. The pier cap at Bent 5 has exposed reinforcing steel at Southeast end on the South side.

GENERAL NOTES:

1. Piers 1 through 7 were inspected underwater.
2. At the time of inspection on October 18, 2007, the waterline was located approximately 11.7 feet below the top of the pier cap at west end of Pier 7. This corresponds to a waterline elevation of 930.2.
3. Soundings indicate the water depth at the time of inspection and are measured in feet.
4. Soundings were taken parallel to the bridge at 1/4 point intervals between the substructure units.

Legend

-2.0 / -5.2	Sounding Depth (10/18/07) / Sounding Depth (9/30/02)
○	CIP Concrete Pipe Pile
○→	CIP Concrete Battered Pipe Pile

Note:

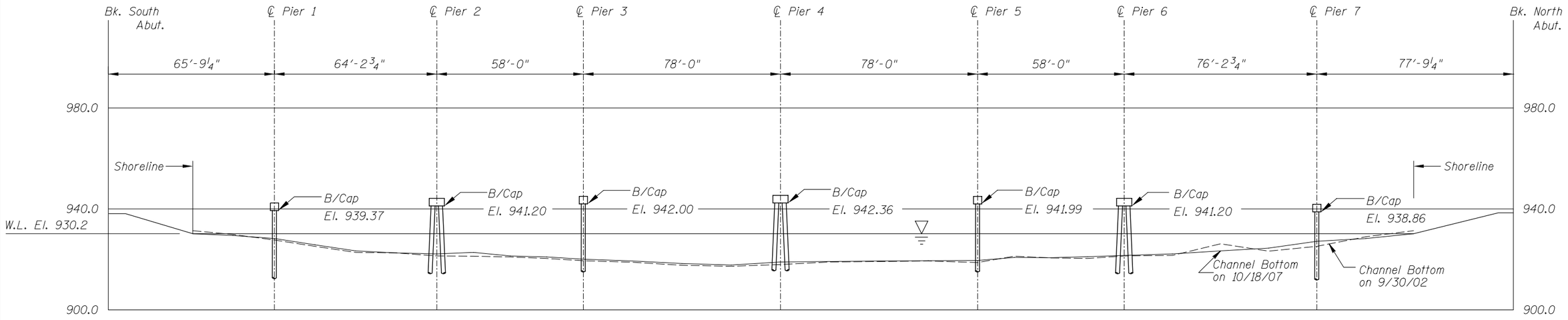
All soundings based on 2007 waterline location.

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION

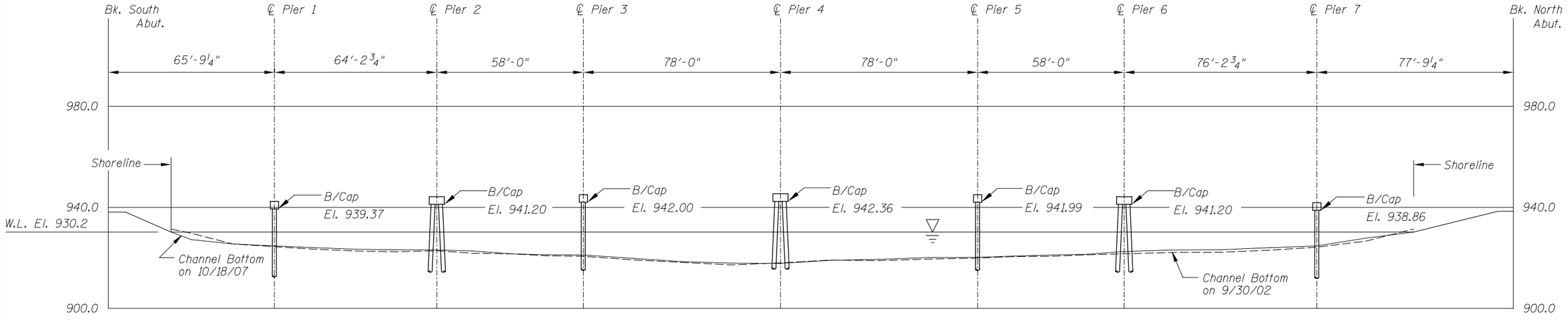
STRUCTURE NO. 27510
OVER THE ARCOLA CHANNEL
DISTRICT 5, HENNEPIN COUNTY

INSPECTION AND SOUNDING PLAN

Drawn By: LJ	COLLINS ENGINEERS 123 North Wacker Drive Suite 300 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com	Date: OCT. 2007
Checked By: VR		Scale: NTS
Code: 52210112		Figure No.: 1



WEST FASCIA PROFILE



EAST FASCIA PROFILE

Note:

Refer to Figure 1 for General Notes.

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

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OVER THE ARCOLA CHANNEL
DISTRICT 5, HENNEPIN COUNTY

WEST AND EAST
FASCIA PROFILES

Drawn By: LJ	COLLINS ENGINEERS, INC. 123 North Wacker Drive Suite 300 Chicago, IL 60606 (312) 704-0300 www.collinsengr.com	Date: OCT.2007
Checked By: VR		Scale: 1"=40'
Code: 52210112		Figure No.: 2

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

DAILY DIVING REPORT

INSPECTORS: Collins Engineers, Inc. DATE: October 18, 2007

ON-SITE TEAM LEADER: Daniel G. Stromberg, P.E., S.E.

BRIDGE NO: 27510 WEATHER: Partly Cloudy, 60°F

WATERWAY CROSSED: Arcola Channel

DIVING OPERATION: X SCUBA _____ SURFACE SUPPLIED AIR

_____ OTHER _____

PERSONNEL: Clayton G. Brookins, Valerie Roustan

EQUIPMENT: Scuba, U/W Light, Scraper, Sounding Pole, Lead Line, Probe Rod, Camera

TIME IN WATER: 11:00 P.M.

TIME OUT OF WATER: 11:45 P.M.

WATERWAY DATA: VELOCITY Negligible/None

VISIBILITY 3.0 feet

DEPTH 14.0 feet maximum at Pier 4

ELEMENTS INSPECTED: Piers 1 through 7

REMARKS: Overall, the piers were in good condition with no defects of structural significance observed. The steel pipe pile casings exhibited light to moderate corrosion from 1.5 feet above to 1 foot below the waterline with minor pitting up to 1/8 inch deep. Several of the piles exhibited minor dents above and/or below the waterline. Piers 1,3, and 6 exhibited cracks extending from the top to the bottom of the pile cap (other caps had similar random cracks). The end of the pile cap at Piers 5 and 7 exhibited areas of section loss with exposed reinforcing steel. Some of the piles (especially at Pier 6) exhibited corrosion (lighter in extent) from the channel bottom to 6 feet above the waterline. The channel bottom at the bridge appeared stable with no significant scour or change since the last inspection.

FURTHER ACTION NEEDED: _____ YES X NO

An above water inspection should address the pile cap end conditions at most piers.

Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 27510
INSPECTORS Collins Engineers, Inc.
ON-SITE TEAM LEADER Daniel G. Stromberg, P.E., S.E.
WATERWAY CROSSED Arcola Channel

INSPECTION DATE October 18, 2007

NOTE: USE ALL APPLICABLE CONDITION DEFINITIONS AS DEFINED IN THE MINNESOTA RECORDING AND CODING GUIDE INCLUDING GENERAL, SUBSTRUCTURE, CHANNEL AND PROTECTION, AND CULVERTS AND WALL DEFINITIONS TO COMPLETE THIS FORM.

CONDITION RATING

			SUBSTRUCTURE						CHANNEL					GENERAL					
UNIT REFERENCE NO.		MAXIMUM DEPTH OF WATER	PILING	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	OTHER	OVERALL SUBSTRUCTURE CONDITION CODE*	SCOUR	EMBANKMENT EROSION	EMBANKMENT PROTECTION	OTHER (DRIFT/DEBRIS)	OVERALL CHANNEL & PROTECTION CONDITION	CONCRETE	STEEL	TIMBER	LOSS OF SECTION	PREVIOUS REPAIR OR MAINTENANCE (CAP)	OTHER
	UNIT DESCRIPTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Pier 1	5.5’	7	N	N	9	N	7	8	8	8	N	8	N	7	N	7	N	N
	Pier 2	9.0’	7	N	N	9	N	7	8	N	N	N	8	N	7	N	7	N	N
	Pier 3	12.0’	7	N	N	9	N	7	8	N	N	N	8	N	7	N	7	N	N
	Pier 4	14.0’	7	N	N	9	N	7	8	N	N	N	8	N	7	N	7	N	N
	Pier 5	13.0’	7	N	N	9	N	7	8	N	N	N	8	N	7	N	7	N	N

*UNDERWATER PORTION ONLY

REMARKS: Overall, the piers were in good condition with no defects of structural significance observed. The steel pipe pile casings exhibited light to moderate corrosion from 1.5 feet above to 1 foot below the waterline with minor pitting up to 1/8 inch deep. Several of the piles exhibited minor dents above and/or below the waterline. Piers 1,3, and 6 exhibited cracks extending from the top to the bottom of the pile cap (other caps had similar random cracks). The end of the pile cap at Piers 5 and 7 exhibited areas of section loss with exposed reinforcing steel. Some of the piles (especially at Pier 6) exhibited corrosion (lighter in extent) from the channel bottom to 6 feet above the waterline. The channel bottom at the bridge appeared stable with no significant scour or change since the last inspection.

NOTES: ATTACH SKETCHES AS NEEDED, IDENTIFY REMARK BY REFERRING TO UNIT REFERENCE NO. AND REMARK NO.
USE GENERAL SECTION TO IDENTIFY OVERALL PRESENCE OF SPALLS, CRACKS, CORROSION, ETC.

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 27510
INSPECTORS Collins Engineers, Inc.
ON-SITE TEAM LEADER Daniel G. Stromberg, P.E., S.E.
WATERWAY CROSSED Arcola Channel

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	UNIT DESCRIPTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Pier 6	9.0’	7	N	N	9	N	7	8	N	N	N	8	N	7	N	7	N	N
	Pier 7	5.5’	7	N	N	9	N	7	8	8	8	N	8	N	7	N	7	N	N

*UNDERWATER PORTION ONLY

REMARKS: Overall, the piers were in good condition with no defects of structural significance observed. The steel pipe pile casings exhibited light to moderate corrosion from 1.5 feet above to 1 foot below the waterline with minor pitting up to 1/8 inch deep. Several of the piles exhibited minor dents above and/or below the waterline. Piers 1,3, and 6 exhibited cracks extending from the top to the bottom of the pile cap (other caps had similar random cracks). The end of the pile cap at Piers 5 and 7 exhibited areas of section loss with exposed reinforcing steel. Some of the piles (especially at Pier 6) exhibited corrosion (lighter in extent) from the channel bottom to 6 feet above the waterline. The channel bottom at the bridge appeared stable with no significant scour or change since the last inspection.

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